

Complications following general anaesthesia for cataract surgery: a comparison of the laryngeal mask airway with tracheal intubation

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Keywords: laryngeal mask airway; cataract surgery; complications; anaesthesia

Summary

The incidence of airway complications following general anaesthesia using either a tracheal tube or a laryngeal mask airway was compared in a prospective, randomized study of 79 patients undergoing elective cataract surgery using a standard anaesthetic technique. Assessment was made both at extubation (which was taken to include removal of the laryngeal mask airway) and for 25 min afterwards. There was a significantly greater incidence of coughing prior to extubation ($P < 0.001$), at extubation ($P < 0.001$) and after extubation ($P < 0.001$) in the tracheal group than in the laryngeal mask airway group. No other airway complications were seen in either group.

Introduction

Coughing after anaesthesia for cataract surgery may cause a rise in intraocular tension and increase the possibility of iris or vitreous prolapse¹. Intermittent positive pressure ventilation (IPPV) is commonly used to control the arterial pressure of carbon dioxide and thus reduce intraocular pressure in patients undergoing general anaesthesia for cataract surgery. Tracheal intubation is the standard means of establishing and securing the airway during general anaesthesia for cataract surgery. The presence of a tracheal tube is a potent stimulus to coughing. Due to the recent introduction of the laryngeal mask airway into clinical practice, it has been suggested that IPPV may be employed without the need for tracheal intubation, thereby reducing the incidence of coughing and other adverse airway sequelae^{2,3}. The aim of this prospective study is to compare the incidence of coughing, laryngospasm, and sore throat in patients emerging from anaesthesia for cataract surgery following the use of either the laryngeal mask airway or a tracheal tube. In this paper the term 'extubation' will refer to the removal of both the laryngeal mask airway and the tracheal tube.

Methods

After local ethical committee approval and informed written consent had been obtained, 79 patients presenting for elective cataract surgery were admitted to the trial. They were randomly allocated to one of two groups. In one group a laryngeal mask airway was used to control the airway, in the other a tracheal tube was used. Exclusion criteria included those for whom a local anaesthetic technique was felt to offer significant advantage and those patients with oesophageal reflux.

Temazepam 10 or 20 mg was given approximately 1 h before induction of anaesthesia to all patients. Anaesthesia was induced with intravenous alfentanil (10 µg/kg) and propofol (1 mg/kg). Neuromuscular blockade was provided by atracurium (0.5 mg/kg). Three minutes after induction either a tracheal tube or laryngeal mask airway was inserted according to randomization. Size 8 tracheal tubes and size 3 laryngeal mask airways were used in female patients, size 9 tracheal tubes and size 4 laryngeal mask airways were used in male patients. Patients' lungs were ventilated with a 66% nitrous oxide in oxygen and isoflurane 0.5–1%. The minute volume was adjusted to obtain an end-tidal carbon dioxide tension of 4 kpa.

At the end of the surgical procedure, residual neuromuscular blockade was reversed with neostigmine 2.5 mg and glycopyrrolate 0.5 mg. Isoflurane and nitrous oxide were withdrawn and a normal end-tidal carbon dioxide tension was achieved using added carbon dioxide. The patients were extubated once spontaneous respiration had returned.

The incidence of coughing and stridor was noted both at extubation and for a 25 min period in the Recovery Room. At a visit made 6 h postoperatively the incidence of sore throat was noted. Those making the observations in the recovery room and at the postoperative visit were blind to the use of tracheal tube or laryngeal mask airway.

Statistical analysis was performed with the unpaired student's *t* and the χ -squared test as appropriate.

Results

The demographic data relating to the patients studied are summarized in Table 1. There were no significant differences between the study groups with respect of age and smoking habits/preoperative respiratory disease.

Laryngeal mask airways were inserted at the first attempt in 37 patients and at the second attempt in five patients. In four patients it was not possible to secure a satisfactory airway with the laryngeal mask. These patients were excluded from the trial. All 37 patients in the tracheal tube group were intubated at the first attempt.

In the tracheal tube group: 19/37 patients coughed just prior to extubation compared to 0/42 in the laryngeal mask airway group ($p < 0.001$); 18/37 patients coughed at extubation compared to 1/42 in the laryngeal mask airway group ($P < 0.001$); 24/37 patients coughed during the recovery period compared to 1/42 in the laryngeal mask airway group ($P < 0.001$); 4/37 patients demonstrated stridor in the recovery period compared to 0/42 in the laryngeal mask airway group (not significant); 11/37 patients complained of

Table 1. Demographic data

	LMA group	ETT group
No.	42	37
Age (SEM)	72.4 years (1.61)	72.6 years (1.98)
Weight (SEM)	72.1 kg (2.23)	66.2 kg (2.39)
Sex ratio (F : M)	19 : 23	22 : 15

LMA=laryngeal mask airway;
ETT=endotracheal tube

sore throat at the postoperative visit compared to 4/42 in the laryngeal mask airway group ($P < 0.05$).

Discussion

The results of this study suggest that in comparable groups undergoing general anaesthesia for cataract extraction using a standard anaesthetic technique, there is a significantly lower incidence of coughing in patients whose airway was controlled using a laryngeal mask airway than in those whose airway was secured with a tracheal tube.

The anaesthetic protocol ensured that both groups were extubated at an equivalent 'depth' of anaesthesia, i.e. as soon as spontaneous respiration returned after the end of the procedure. In this context the difference between the two groups must be ascribed to the airway adjunct used. The laryngeal mask airway lies in a wholly supraglottic position, whereas the tracheal tube passes through the vocal cords into the trachea and may therefore be presumed to provide a greater stimulus to sensory receptors involved in airway protection reflex arcs. A greater incidence of coughing and stridor may therefore be expected, and this view is supported not only by the results of this trial but also by published observations that the laryngeal mask airway tends to provoke swallowing rather than the cough reflex in patients recovering from general anaesthesia⁴.

Four of 37 intubated patients suffered stridor in the recovery period. Although this was not significantly different from the incidence in the laryngeal mask airway group, it is an incidence which is higher than might be expected in the normal conduct of general anaesthesia for cataract extraction. The two groups in this study were extubated at an equivalent depth of anaesthesia but it may be reasonable to assert that this was intermediate between the two depths commonly associated with stridor-free extubation, i.e. the patients were neither deeply anaesthetized enough to suppress airway protective reflexes nor awake enough to avoid laryngospasm in the recovery period.

With recent improvements in suture material, it may be less important to prevent patients from coughing postoperatively following cataract extraction⁵. However, coughing, laryngospasm, and breathholding all have the capacity to cause hypoxaemia, and a technique that reduces their incidence must therefore be considered a potential advantage to the patient.

Recent evidence that the laryngeal mask airway may evoke a lesser 'pressor response' than a tracheal tube may also give it some advantage to those patients (who form a significant proportion of those undergoing cataract extraction) who are particularly at risk from hypertension and tachycardia⁶.

It must be pointed out, however, that the use of the laryngeal mask airway is not universally applicable to patients undergoing this type of surgery. Any patient at risk from regurgitation should be intubated with a cuffed tracheal tube. This group of patients includes those with a clear history of oesophageal reflux, with proven hiatus hernias and gastric outflow obstruction. It may not be possible satisfactorily to inflate the lungs of all patients with low compliance or high airways resistance without a substantial leak around a laryngeal mask airway. These patients may be better suited to intubation with a tracheal tube. However, in practice, such contraindications are infrequent and the use of the laryngeal mask airway is applicable to the vast majority of patients having cataract extraction under general anaesthesia.

In summary, our results indicate that the laryngeal mask airway reduces the incidence of immediate postoperative upper airway complications following general anaesthesia for cataract surgery and its use in this situation may therefore offer an advantage to many patients.

References

- 1 Atkinson RS, Rushman GB, Lee J Alfred. *A synopsis of anaesthesia*, 10th edn. Bristol: Wright, 1987:464-5
- 2 Brain AIJ. The laryngeal mask - a new concept in airway management. *Br J Anaesth* 1983;55:801
- 3 Brain AIJ, McGhee TD, McAteer EJ, Thomas A, Abu-Saad MAW, Bushman JA. The laryngeal mask airway. *Anaesthesia* 1985;40:356-61
- 4 Brain AIJ. New approaches to management of the airway. *Curr Med Lit (Anaesth)* 1990;4(2):35-43
- 5 Foulds WS. The Changing pattern of eye surgery. *Br J Anaesth* 1980;52:643
- 6 Braudie N, Clements EAF, Hodges UM, Andrews BP. The pressor response and laryngeal mask insertion, a comparison with endotracheal intubation. *Anaesthesia* 1989;44:551-4

(Accepted 12 October 1992)